

Chapter 7 Polynomial Functions

7-1 Polynomial Functions

ex

$$\underline{7}z^{\textcircled{3}} - 4z^2 + z$$

Degree? 3 (In one variable)Leading coefficient? 7

ex

$$9y - 3y^2 + 4y^{\textcircled{4}}$$

Degree? 4Leading coefficient? 4

ex

$$3c^2 + 4c - 2c^{-1}$$

Not Poly.

Degree? _____

Leading coefficient? _____

$$f(x) = 3x^2 - 3x + 1$$

$$f(4) = 3(4)^2 - 3(4) + 1$$

$$= 37$$

$$f(-2) = 3(-2)^2 - 3(-2) + 1$$

$$= 19$$

$$p(x) = 2x^4 - x^3 + 3x$$

$$p(y^3) = 2(y^3)^4 - (y^3)^3 + 3(y^3)$$

$$2y^{12} - y^9 + 3y^3$$

Graphs of functions

Degree

Constant

$$f(x) = 4$$

0

Linear

$$f(x) = 3x - 9$$

1

Quadratic

$$f(x) = x^2 - 2x - 3$$

2

Cubic

$$f(x) = x^3$$

3

Quartic

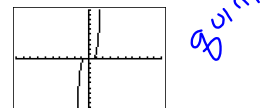
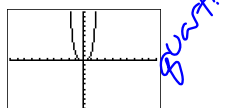
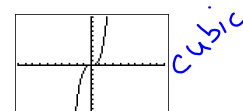
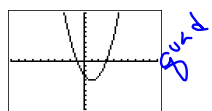
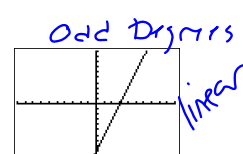
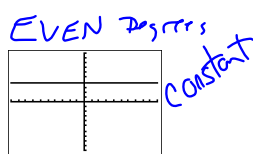
$$f(x) = x^4$$

4

Quintic

$$f(x) = x^5$$

5

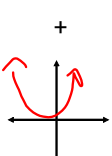
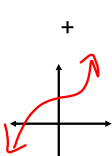
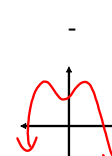
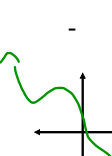


Let's look at the end behavior.

End Behavior--behavior of graph as x approaches $+\infty$ and $-\infty$

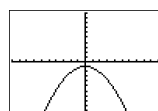
Determined by degree and leading coefficient

Summary

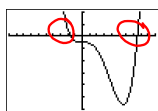
Even	Odd	Even	Odd
+	+	-	-
			
As $x \rightarrow +\infty$, $f(x) \rightarrow +\infty$ As $x \rightarrow -\infty$, $f(x) \rightarrow +\infty$	As $x \rightarrow +\infty$, $f(x) \rightarrow +\infty$ As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$	As $x \rightarrow +\infty$, $f(x) \rightarrow -\infty$ As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$	As $x \rightarrow +\infty$, $f(x) \rightarrow -\infty$ As $x \rightarrow -\infty$, $f(x) \rightarrow +\infty$

Examples

- Describe the end behavior.
- Is the function odd or even?
- State the number of zeros.



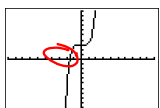
- As $x \rightarrow +\infty$, then $f(x) \rightarrow -\infty$
As $x \rightarrow -\infty$, then $f(x) \rightarrow -\infty$
- ~~even~~ **even**
- 0**



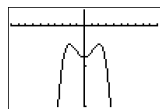
- As $x \rightarrow +\infty$, then $f(x) \rightarrow +\infty$
As $x \rightarrow -\infty$, then $f(x) \rightarrow +\infty$
- ~~even~~ **even**
- 2**

Examples

- Describe the end behavior.
- Is the function odd or even?
- State the number of zeros.



- As $x \rightarrow +\infty$, then $f(x) \rightarrow +\infty$
As $x \rightarrow -\infty$, then $f(x) \rightarrow -\infty$
- odd
- 1



- As $x \rightarrow +\infty$, then $f(x) \rightarrow -\infty$
As $x \rightarrow -\infty$, then $f(x) \rightarrow -\infty$
- even
- 0

HW

p350-351

16-21, 30, 34, 39-44